

Contents

Preface	vii
I. The Gulf's Setting	
Physical Environment of the Gulf Relevant to Marine Pollution: An Overview <i>by Charles R. C. Sheppard</i>	3
The Gulf: Its Biological Setting <i>by A. R. G. Price, C. R. C. Sheppard and C. M. Roberts</i>	9
The Gulf: Human Impacts and Management Initiatives <i>by A. R. G. Price</i>	17
II. Post-War Biophysical Assessment	
<i>Physical and Chemical Environment</i>	
<i>Mt Mitchell</i> Oceanographic Expedition in the Gulf <i>by Robert C. Clark, Jr and Lisa C. Symons</i> ..	31
Physical Oceanography of the Gulf, Strait of Hormuz, and the Gulf of Oman: Results from the <i>Mt Mitchell</i> Expedition <i>by R. Michael Reynolds</i>	35
Computation of the Residual Flow in the Gulf using the <i>Mt Mitchell</i> Data and the KFUPM/RI Hydrodynamical Models <i>by R. W. Lardner, A. H. Al-Rabeah, N. Gunay, M. Hossain, R. M. Reynolds and W. J. Lehr</i>	61
On Mathematical and Empirical Models for Surface Oil Spill Transport in the Gulf <i>by Ala Al-Rabeah, Robin Lardner, Nazmi Gunay, Rizwanullah Khan, Mahmood Hossain, R. M. Reynolds and W. J. Lehr</i>	71
The Influence of the Kuwaiti Oil Well Fires on Seawater Temperature in the Western Gulf <i>by John C. McCain, Daniel W. Beard and Yusef H. Fadlallah</i>	79
State of Oil Pollution in the Northern Arabian Sea after the 1991 Gulf Oil Spill <i>by R. Sen Gupta, S. P. Fondevila and R. Alagarsamy</i>	85
Distribution of Oil along the Saudi Arabian Coastline (May/June 1991) as a Result of the Gulf War Oil Spills <i>by Erich R. Gundlach, John C. McCain and Yusef H. Fadlallah</i>	93
Chemical Characterization of Sediments from the Gulf Area after the 1991 Oil Spill <i>by Abdulrahman A. Al-Arfaj and Ibrahim A. Alam</i>	97
Trace Elements in Sediments of the Western Gulf <i>by Ali S. Basaham and Sultan S. Al-Lihaibi</i>	103
Contamination of Nearshore Subtidal Sediments of Saudi Arabia from the Gulf War Oil Spill <i>by Jacqueline Michel, Miles O. Hayes, Richard S. Keenan, Theodor C. Sauer, John R. Jensen and Sunil Narumalani</i>	109
Hydrocarbon Source Identification and Weathering Characterization of Intertidal and Subtidal Sediments Along the Saudi Arabian Coast after the Gulf War Oil Spill <i>by Theodor C. Sauer, John S. Brown, Paul D. Boehm, Don V. Aurand, Jacqueline Michel and Miles O. Hayes</i>	117
Distribution and Weathering of Shoreline Oil One Year After the Gulf War Oil Spill <i>Miles O. Hayes, Jacqueline Michel, Todd M. Montello, Don V. Aurand, Ahmed M. Al-Mansi, Abdul Halim Al-Moamen, Theodor C. Sauer and Gordon W. Thayer</i>	135
<i>Marine and Coastal Ecosystems</i>	
Broadscale Changes in Coastal Ecosystems of the Western Gulf following the 1991 Gulf War <i>by A. R. G. Price, T. J. Wrathall, P. A. H. Medley and A. H. Al-Moamen</i>	143
Has the Gulf War Affected Coral Reefs of the Northwestern Gulf? <i>by Nigel Downing and Callum Roberts</i>	149

Short-term Damage to Coastal Bird Populations in Saudi Arabia and Kuwait Following the 1991 Gulf War Marine Pollution by <i>M. I. Evans, P. Symens and C. W. T. Pilcher</i>	157
Effect of the 1991 Gulf War on Metal Bioaccumulation by the Clam (<i>Meretrix meretrix</i>) by <i>M. Sadiq and J. C. McCain</i>	163
Petroleum Hydrocarbons and Trace Metals in Nearshore Gulf Sediments and Biota Before and After the 1991 War: An Assessment of Temporal and Spatial Trends by <i>S. W. Fowler, J. W. Readman, B. Oregioni, J.-P. Villeneuve and K. McKay</i>	171
Concentration of Heavy Metals in Marine Organisms Around Qatar Before and After the Gulf War Oil Spill by <i>Tariq W. Kureishy</i>	183
Hydrocarbons and Related Photo-oxidation Products in Saudi Arabian Gulf Coastal Waters and Hydrocarbons in Underlying Sediments and Bioindicator Bivalves by <i>Manfred G. Ehrhardt and Kathryn A. Burns</i>	187
Subtidal Benthic Community Respiration and Production near the Heavily Oiled Gulf Coast of Saudi Arabia by <i>Kathryn A. Burns, Manfred G. Ehrhardt, Brian L. Howes and Craig D. Taylor</i>	199
Anomalous Pneumatophores and Adventitious Roots of <i>Avicennia marina</i> (Forssk.) Vierh. Mangroves Two Years After the 1991 Gulf War Oil Spill in Saudi Arabia by <i>Benno Böer</i>	207
Ecology of Seagrasses in Northeastern Saudi Arabia One Year After the Gulf War Oil Spill by <i>W. J. Kenworthy, M. J. Durako, S. M. R. Fatemi, H. Valavi and G. W. Thayer</i>	213
Assessment of the Toxicity of Kuwait Crude Oil on the Photosynthesis and Respiration of Seagrasses of the Northern Gulf by <i>Michael J. Durako, William J. Kenworthy, Seyed M. R. Fatemi, Hamseh Valavi and Gordon W. Thayer</i>	223
Preliminary Damage Assessment of Algal Mats Sites Located in the Western Gulf Following the 1991 Oil Spill by <i>Assad A. Al-Thukair and Khattab Al-Hinai</i>	229
Post-Spill Zooplankton Distribution in the NW Gulf by <i>F. Y. Al-Yamani, K. Al-Rifaie and W. Ismail</i>	239
Planktonic Decapoda from the Western Coast of the Gulf by <i>Ali M. Al-Aidaroos</i>	245

Fisheries and Fish

Preliminary Assessment of the Effects of the 1991 Gulf War on Saudi Arabian Prawn Stocks by <i>C. P. Mathews, S. Kedidi, N. I. Fita, A. Al-Yahya and K. Al-Rasheed</i>	251
Abundance of Zooplankton and Penaeid Shrimp Larvae in the Western Gulf: Analysis of Pre-War (1991) and Post-War Data by <i>A. R. G. Price, C. P. Mathews, R. W. Ingle and K. Al-Rasheed</i>	273
Fisheries Study in the Gulf by <i>O. A. Hashim</i>	279
Analyses for Petroleum-related Contaminants in Marine Fish and Sediments Following the Gulf Oil Spill by <i>Margaret M. Krahm, Gina M. Ylitalo, Jon Buzitis, Jennie L. Bolton, Catherine A. Wigren, Sin-Lam Chan and Usha Varanasi</i>	285
Cytochrome P450 Observations in Gulf Fish by <i>Jonny Beyer and Anders Goksøyr</i>	293
Polycyclic Aromatic Hydrocarbons in Edible Tissue of Fish from the Gulf After the 1991 Oil Spill by <i>Sami Al-Yakoob, Talat Saeed and Huda Al-Hashash</i>	297

III. Pollution Control and Conservation

On the Impacts of the 1991 Gulf War on the Environment of the Region: General Observations by <i>Makram A. Gerges</i>	305
The Creation of a Marine Sanctuary after the 1991 Gulf War Oil Spill by <i>Friedhelm Krupp and David A. Jones</i>	315

Intertidal Clean-up Activities and Natural Regeneration on the Gulf Coast of Saudi Arabia from 1991 to 1992 after the 1991 Gulf Oil Spill by <i>Iain Watt, Timothy Woodhouse and David A. Jones</i>	325
Saudi Arabia's Response to the 1991 Gulf Oil Spill by <i>Nizar I. Tawfiq and David A. Olsen</i>	333
IV. Synthesis and Conclusions	
Considerations for the Assessment of Environmental Consequences of the 1991 Gulf War by <i>Peter Literathy</i>	349
The 1991 Gulf War Oil Spill—Lessons from the Past and a Warning for the Future by <i>Ibrahim A. H. Alam</i>	357
Multi-disciplinary Modelling: an Overview and Practical Implications for the Governance of the Gulf Region by <i>J. M. McGlade and A. R. G. Price</i>	361
Index—Volume 27	377